Harsco GasServ

CST Cryo-Science Technologies


# Cryostorage Systems

*for medical, scientific and industrial applications*

Taylor-Wharton
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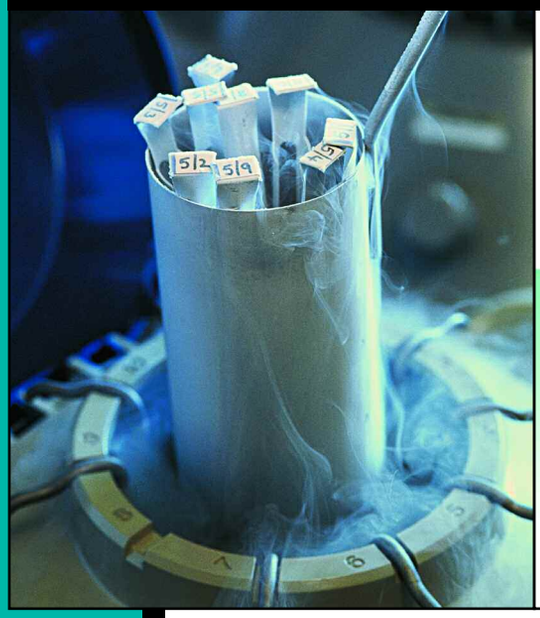
# Contents

# Taylor-Wharton Cryo-Science Technologies

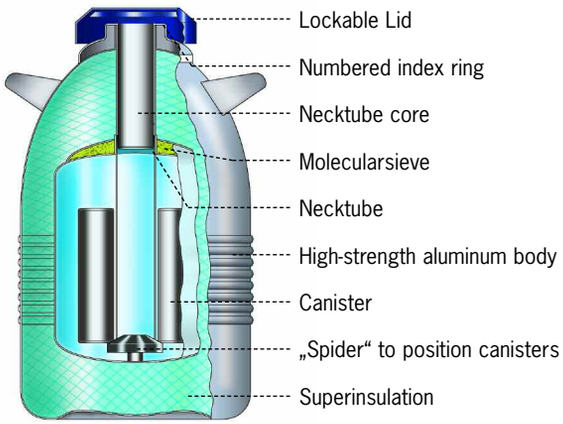
*»Technology you can rely on«*




**Taylor-Wharton Cryogenics belongs to the Harsco GasServ Group, a leading manufacturer with over 40 years of experience in the design and production of cryogenic storage vessels for liquefied gases.**

Facilities in the USA, Europe, Malaysia and China produce a wide range of equipment, including cryogenic vessels for transport and storage as well as containers for the storage of liquefied gases ranging in size from 3 to 400,000 liters.

Our customers can rely on the advice and service of a competent sales organization with a worldwide presence.




The number of applications for liquefied gases is constantly increasing. Special vessels are needed not only for cryogenic storage of biological material but also for many industrial applications. Examples include the production of semiconductors and microchips (high purity gases), laser welding, shock and dry freezing processes as well as large dispensing systems for carbonated beverages such as those found in stadiums and similar venues.

Taylor-Wharton cryogenic vessels are based on the principle of complete thermal insulation. They consist of an inner vessel and an outer body separated by a stable vacuum, which virtually precludes any transfer of heat from the ambient environment to the inner vessel. Additional layers provide what is referred to as superinsulation to protect the vessel against the warming effect of infrared radiation.

Taylor-Wharton cryogenic vessels are designed to hold either canisters or racks. Depending on the application the material can be stored in the liquid phase or in the vapour phase of the tank.

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# K Series Cryogenic Storage Systems


K Series systems are used throughout the world wherever it is necessary to store biological specimens or larger objects such as organs for transplantation. Like all Taylor-Wharton vessels, the ultra high capacity refrigerators use nitrogen in liquid or vapor phase for cooling. This provides a series of important benefits as compared with mechanical refrigeration systems, especially in terms of environmental considerations:

• Greater reliability • No heat output • Silent operation
• Lower temperature • Virtually maintenance-free • Safety back up to power failures

Taylor-Wharton K Series systems are designed to accommodate various inventory control systems. The high capacity makes it possible to hold up to 38,350 2 ml vials or up to 739,500 0,25 ml straws. Normally 10K and larger systems are connected to a liquid nitrogen tank by means of a hose (see p. 14) equipped with a CryoCon unit, which is an electronic Taylor-Wharton automatic level controller that is available in various models (see p. 8/9).

In case it is necessary to make absolutely sure that specimens do not come into contact with liquid nitrogen (to avoid cross contamination), it is possible to place a gas phase frame inside the system. The liquid tight frame ensures a reliable separation of the specimen from the liquid nitrogen and at the same time functions as a guide for the individual racks (see p. 11).
10K and larger systems are available with the CE mark in compliance with the Medical Devices Directive MDD 93/42 EC.

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## Specifications

| Models | | 3K | 10K | 24K | 38K |
|---|---|---|---|---|---|
| $LN_2$ capacity | l | 48 | 165 | 365 | 590 |
| Overall diameter (width x depth) | mm | 391 | 587 x 775 | 864 x 965 | 1067 x 1397 |
| Overall height (with lid open) | mm | – | 1753 | 1930 | 2286 |
| Overall height | mm | 754 | 1118 | 1118 | 1245 |
| Internal diameter | mm | 356 | 533 | 787 | 991 |
| Useable height | mm | 488 | 737 | 737 | 737 |
| Evaporation rate [1] | l/24 h | 2,5 | 5,0 | 7,0 | 8,0 |
| Static holding time [1] | Days | 19 | 33 | 52 | 74 |
| Weight, empty | kg | 19,1 | 111,0 | 184,0 | 256,0 |
| Weight, full (without inventory control systems) | kg | 56,7 | 243,0 | 474,0 | 733,0 |
| Recommended $LN_2$ supply tank | | XL Series | XL Series | XL Series | XL Series |
| Suitable for bag storage | | • | • | • | • |
| Special remarks | | Optional roller base recommended (see p. 26) | 90 mm distance rear to wall required | 270 mm distance rear to wall required | 1155 mm door width required |

[1] Evaporation rate and static holding time are nominal. Actual rate may be affected by the nature of the contents, atmospheric conditions, container history and manufacturing tolerances

## Straw Capacity

| | | | | |
|---|---|---|---|---|
| Number of canisters 67 mm | 21 | 46 | 107 | 174 |
| Number of levels (goblets) | 3 | 5 | 5 | 5 |
| Number of goblets 65 mm | 63 | 230 | 535 | 870 |
| Number of straws 0,25 ml | 53.550 | 195.500 | 454.750 | 739.500 |
| Number of straws 0,50 ml | 23.940 | 87.400 | 203.300 | 330.600 |

## Vial Capacity

| | | | | |
|---|---|---|---|---|
| Liquid phase | 3.726 | 10.400 | 24.050 | 38.350 |
| Vapor phase | 2.484 | 8.800 | 20.350 | 32.450 |
| Vapor phase with sealed frame | – | 9.100 | 21.775 | – |

# Laboratory Archival Biological Storage



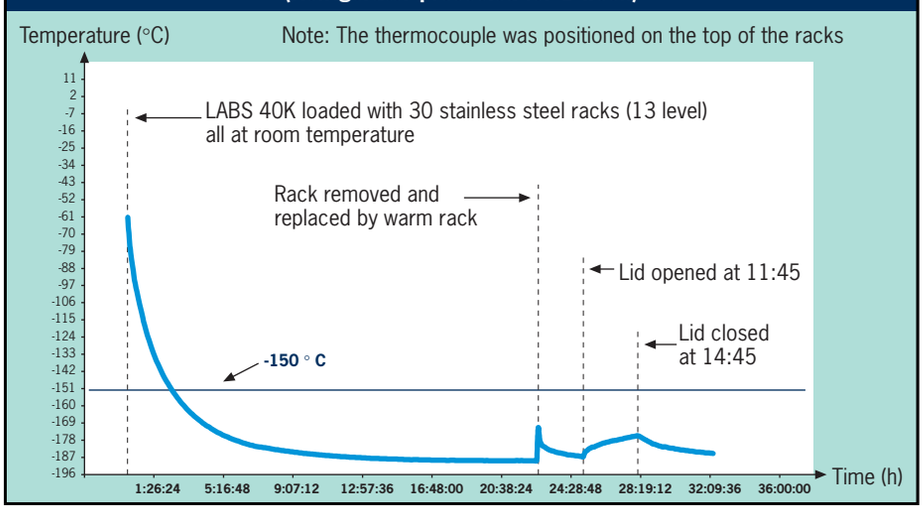
LABS Series freezers are designed for efficient long-term storage of larger volumes of specimens. With a capacity of up to 80,000 2ml vials, a storage temperature virtually at the level of the liquid nitrogen temperature even in the gas phase and low nitrogen consumption, the LABS Series sets new industry benchmarks. In addition to this exceptional performance, these freezers also feature ergonomic design.

For example, the flat stainless-steel table-top makes a convenient working surface, and a folding step permits easier access to the stored material. The extremely easy-to-rotate turntable with aluminum deviders permits quick, convenient access to the inventory control system as well as easy sample location. Each compartment is colour coded.

All models are available with automatic level controllers and the CE mark in compliance with Medical Devices Directive MDD 93/42EC.

The hinged booted lid is easy to operate and to clean. The lid switch provides signals to the optional controller for lid open alarm, auto defog and quick chill.

**LABS temperature profile with $LN_2$ at bottom tray**
**(Refrigerator precooled for 1 week)**

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## Specifications

| Models | | LABS 20K | LABS 40K | LABS 80K |
|---|---|---|---|---|
| $LN_2$ capacity | l | 407 | 606 | 1350 |
| $LN_2$ capacity below platform | l | 46 | 76 | 140 |
| Overall diameter | mm | 864 | 1143 | 1511 |
| Overall height | mm | 1455 | 1455 | 1455 |
| Working height from step to lid opening | mm | 1080 | 1080 | 1080 |
| Internal diameter | mm | 750 | 1029 | 1397 |
| Useable height | mm | 762 | 762 | 762 |
| Neck diameter | mm | 330 | 457 | 622 |
| Reference value evaporation rate [1] | l/24 h | 4 | 4,5 | 8 |
| Evaporation rate [2] | l/24 h | 7 | 8,8 | 11 |
| Static holding time [2] | Days | 102 | 135 | 169 |
| Weight, empty | kg | 295 | 417 | 703 |
| Weight, full (without inventory control systems) | kg | 624 | 907 | 1794 |
| Recommended $LN_2$ supply tank | | XL-Series | XL-Series | XL-Series |
| Max. capacity 2ml vials in liquid/vapor phase | | 19.500 | 41.600 | 79.300 |
| Suitable for bag storage | | • | • | • |

[1] Reference value without turntable
[2] Evaporation rate and static holding time are nominal. Actual rate may be affected by the nature of the contents, atmospheric conditions, container history and manufacturing tolerances

## Straw Capacity

| | | | |
|---|---|---|---|
| Number of canisters 67 mm | 79 | 156 | 313 |
| Number of levels (goblets) | 5 | 5 | 5 |
| Number of goblets 65 mm | 395 | 780 | 1.565 |
| Number of straws 0,25 ml | 335.750 | 663.000 | 1.330.250 |
| Number of straws 0,50 ml | 150.100 | 296.400 | 594.700 |

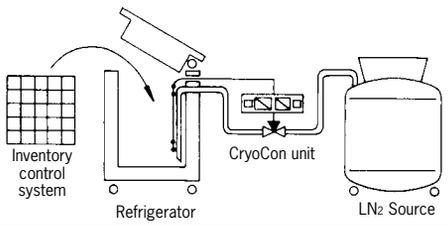
# Electronic Controllers


## Automatic Level Controllers

**CryoCon automatically monitors and controls the level of liquid nitrogen**

The CryoCon controller comes with an array of features and options for flexibility in the combination of vessels, in the choice of liquid nitrogen supply and controls and in the programming and documentation through a PC or a computer.

**System layout**




### CryoCon AFT-3L

**Features**

- Level display
- Level monitoring and automatic refilling
- Temperature display
- Temperature control
- Alarms for high temperature, level, sensor fault, low nitrogen supply, open lid, unauthorized access
- Manual filling
- Data logging with serial port for PC/printer for temperature, level, alarm, filling activity, etc.
- Simultaneous or sequential filling in the case of multiple installations
- Connection for centralized gas bypass control
- Automatic defogging when lid is open
- Quick chill when lid is closed
- Password-controlled access and programming
- Update of controller software through PC and Cable
- Updated software can be forwarded by e-mail or CD

**Options**

- RS 485 interface
- Gas bypass individual
- 4-20mA, 0-2 and 0-10V interface for temperature recording
- CryoData PC software
- PC/Printer cable

**CryoCon AF-1D**

**Features**

- Level indication
- Alarms for level, lid open, low nitrogen supply and sensor fault
- Level monitoring and automatic refilling
- Automatic defogging when lid is opened
- Quick chill when lid is closed
- Manual filling

# CryoVent M360 Gas Bypass System


Typically cryogenic storage installations consist of one or more refrigerators connected by insulated pipework to a bulk liquid nitrogen supply vessel. When filling one or more refrigerators, the cooling down of the lines creates substantial volumes of gas. This gas, which is normally forced out through the liquid in the refrigerator and into the room, can cause various problems:

- Ice build up
- Warming up and evaporation of nitrogen inside the vessel
- Low oxygen concentration inside the room

The use of a Taylor-Wharton CryoVent M360 gas bypass system avoids these problems.

**Operation of the M360**

- When one of the refrigerators begins to fill, the simultaneous fill signal from the controller signals to the M360 controller that liquid is required.
- The M360 controller sends out a signal to all controllers of the refrigerators disconnecting the fill valves and preventing the filling. At the same time a valve is opened to vent gas from the pipe-work.
- When all gas has been exhausted from the pipe-work the presence of liquid at the vent valve is detected by the thermocouple sensor. The M360 closes the vent valve and allows the fill valves to operate and fill the refrigerators.
- A second temperature sensor installed downstream of the first sensor triggers an alarm upon contact with $LN_2$ in order to avoid that liquid nitrogen passes through the ventline.



# Computer-Controlled Freezers

**for cryogenic preservation of biological specimens**


Sy-Lab's new ICECUBE Series uses advanced computer technology to create, control and run freezing programs. The system features a touch screen user interface and is available with 16, 36 and 72 l chambers. It is designed to freeze straws, vials or blood bags and can be used for IVF, cell lines, umbilical cord blood, bone marrow/stem cells, skin, homografts, etc.

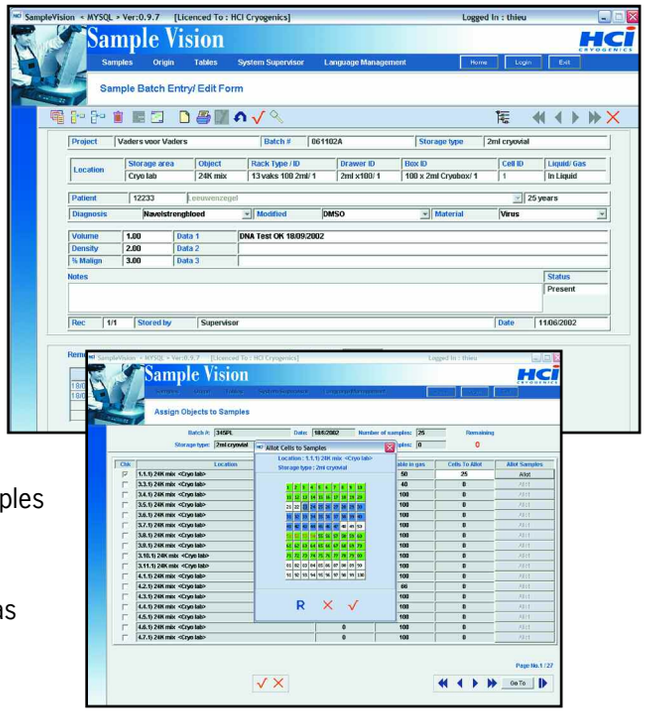
Further highlights include the transparent chamber lid, permanent $LN_2$ supply pressure monitoring, crystallization through auto seeding or vibration and data archiving on a built-in advanced PC with LAN card.

Specifications available upon request.

# Sample Vision

**for efficient data archiving and localization of samples**

Sample Vision is one of the most advanced software programs available for controlling, archiving and documenting large volumes of data on cryostored biogenic materials and samples. The program permits accurate storage and localization of each individual sample and offers an array of options in combination with other important data. Access to data can be completely or partially restricted. With Sample Vision, it takes only seconds to search through thousands of samples for compliance with different combinations of data.




**Functions:**

- Search for one or all samples from any group of samples
- Password-protected access for any or all samples
- Supports any browser
- Practice-based increase in the number of search areas
- Reports can be viewed on monitor
- Language same as that selected for PC
- Can be accessed and controlled through intranet or web-enabled

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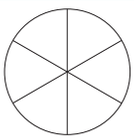
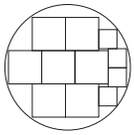
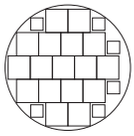
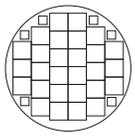
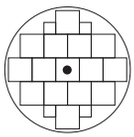
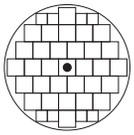
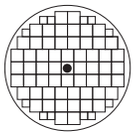
# Inventory Control Systems for Vials



Taylor-Wharton inventory control systems are specifically designed for different types of vessels which are part of the cryo-science technology. They accommodate standard 2ml vials. Various material combinations are available for different vessels. Other systems are also available upon request.

- **Aluminum racks with boxes of plastic or special cardboard**
- **Standard for 3K: aluminum racks and drawers, plastic vial dividers**

| Model | Rack Arrangement | Storage phase | Number of triangular aluminum racks | Shelves per rack | Number of plastic dividers | Total number of 2ml vials |
|---|---|---|---|---|---|---|
| 3K |  | Liquid | 6 | 9 | 54 | 3.726 |
| | | Vapor | 6 | 6 | 36 | 2.484 |

| Model | Rack Arrangement | Storage phase | Number of aluminum racks | | Shelves per rack | Number of cryoboxes | | Total number of 2ml vials |
|---|---|---|---|---|---|---|---|---|
| | | | 5x5 | 10x10 | | 5x5 | 10x10 | |
| 10K |  | Liquid | 4 | 7 | 13 | 52 | 91 | 10.400 |
| | | Vapor | 4 | 7 | 11 | 44 | 77 | 8.800 |
| 24K |  | Liquid | 6 | 17 | 13 | 78 | 221 | 24.050 |
| | | Vapor | 6 | 17 | 11 | 66 | 187 | 20.350 |
| 38K |  | Liquid | 6 | 28 | 13 | 78 | 364 | 38.350 |
| | | Vapor | 6 | 28 | 11 | 66 | 308 | 32.450 |
| LABS 20K |  | Vapor/Liquid | 4 | 14 | 13 | 52 | 182 | 19.500 |
| LABS 40K |  | Vapor/Liquid | 8 | 30 | 13 | 104 | 390 | 41.600 |
| LABS 80K |  | Vapor/Liquid | 12 | 58 | 13 | 156 | 754 | 79.300 |

Racks: 10 x 10 for 100 vial boxes, 5 x 5 for 25 vial boxes

# Inventory Control Systems for Bags


| Bag type ① |
|---|
| Cryocyte 50 (R9951) |
| Cryocyte 50 (R9951) |
| DF-170 |
| DF-170 |
| DF-170 |
| DF-170 |
| DF-170 |
| DF-200 |
| DF-200 |
| Cryocyte 250 (R9953) |
| Cryocyte 250 (R9953) |
| Cryocyte 250 (R9953) |
| Cryocyte 250 (R9953) |
| Cryocyte 500 (R9955) + |
| Cryocyte 500 (R9955) + |
| Cryocyte 500 (R9955) + |
| Cryocyte 500 (R9955) + |
| Cryocyte 500 (R9955) + |
| DF-700 |
| DF-700 |
| DF-700 |
| DF-700 |
| Cryocyte 750 (R9957) |
| Cryocyte 750 (R9957) |
| Cryocyte 750 (R9957) |
| Cryocyte 750 (R9957) |
| Cryocyte 750 (R9957) |
| Cryocyte 1000 (R9959) |
| Cryocyte 1000 (R9959) |
| Cryocyte 1000 (R9959) |
| Cryocyte 1000 (R9959) |
| DF-1000/1200 |
| DF-1000/1200 |
| DF-1000/1200 |
| DF-1000/1200 |
| DF-1000/1200 |
| DF-1000/1200 |
| Eppendorf vials |

Systems for the storage of transplants such as stem cells/bone marrow, erythrocyte concentrates, homografts, skin, etc., must meet special requirements. Taylor-Wharton offers systems that permit convenient, reliable handling, labeling and retrieval.

The systems consist of three components:

- **Stainless steel frame to hold racks**
- **Aluminum racks that are inserted from above**
- **Boxes to hold the bags that are inserted into the racks from the side**

The boxes are made of special high-quality cardboard that retains all of its properties when immersed in liquid nitrogen.
Various inventory control systems are available for standard bags. The choice of a system is based on the type and number of existing bags and the storage phase (liquid or gaseous).

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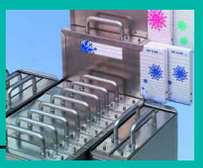




| Bag capacity Vapor/Liquid ❷ | Vessel type ❸ | Storage phase Vapor/Liquid | Volume (ml) | Number of racks | Height units | Box size inside (mm) |
|---|---|---|---|---|---|---|
| (288/336) 384 | 10K | Vapor/Liquid | 10 – 20 | 24 | (6/7) 8 | 146 x 77 x 16 |
| (672/784) 896 | 24K | Vapor/Liquid | 10 – 20 | 56 | (6/7) 8 | 146 x 77 x 16 |
| 48 | 3K | Vapor/Liquid | 85 | 6 | 3/4 | 211 x 103 x 16 |
| 150/180 | 10K | Vapor/Liquid | 85 | 30 | 5/6 | 211 x 103 x 16 |
| 160/192 | 10K | Vapor/Liquid | 85 | 16 | 5/6 | 211 x 103 x 16 |
| 340/408 | 24K | Vapor/Liquid | 85 | 68 | 5/6 | 211 x 103 x 16 |
| 400/480 | 24K | Vapor/Liquid | 85 | 40 | 5/6 | 211 x 103 x 16 |
| 114/152 | 10K | Vapor/Liquid | 100 | 19 | 3/4 | 190 x 155 x 16 |
| 252/336 | 24K | Vapor/Liquid | 100 | 42 | 3/4 | 190 x 155 x 16 |
| 128/160 | 10K | Vapor/Liquid | 30 – 70 | 16 | 4/5 | 173,5 x 133 x 16 |
| 144/180 | 10K | Vapor/Liquid | 30 – 70 | 9 | 4/5 | 350 x 133 x 16 |
| 320/400 | 24K | Vapor/Liquid | 30 – 70 | 40 | 4/5 | 173,5 x 133 x 16 |
| 352/440 | 24K | Vapor/Liquid | 30 – 70 | 44 | 4/5 | 350 x 133 x 16 |
| 20/30 | 3K | Vapor/Liquid | 55 – 100 | 5 | 2/3 | 235 x 133 x 16 |
| 108/135 | 10K | Vapor/Liquid | 55 – 100 | 27 | 4/5 | 235 x 133 x 16 |
| 120/150 | 10K | Vapor/Liquid | 55 – 100 | 15 | 4/5 | 235 x 133 x 16 |
| 260/325 | 24K | Vapor/Liquid | 55 – 100 | 65 | 4/5 | 235 x 133 x 16 |
| 296/370 | 24K | Vapor/Liquid | 55 – 100 | 37 | 4/5 | 235 x 133 x 16 |
| 72/96 | 10K | Vapor/Liquid | 350 | 24 | 3/4 | 282 x 155 x 16 |
| 72/96 | 10K | Vapor/Liquid | 350 | 12 | 3/4 | 282 x 155 x 16 |
| 156/208 | 24K | Vapor/Liquid | 350 | 52 | 3/4 | 282 x 155 x 16 |
| 180/240 | 24K | Vapor/Liquid | 350 | 30 | 3/4 | 282 x 155 x 16 |
| 16/24 | 3K | Vapor/Liquid | 80 – 190 | 4 | 2/3 | 275 x 133 x 16 |
| 96/120 | 10K | Vapor/Liquid | 80 – 190 | 24 | 4/5 | 275 x 133 x 16 |
| 104/130 | 10K | Vapor/Liquid | 80 – 190 | 13 | 4/5 | 275 x 133 x 16 |
| 216/270 | 24K | Vapor/Liquid | 80 – 190 | 60 | 4/5 | 275 x 133 x 16 |
| 240/300 | 24K | Vapor/Liquid | 80 – 190 | 30 | 4/5 | 275 x 133 x 16 |
| 64/80 | 24K | Vapor/Liquid | 125 – 270 | 16 | 4/5 | 350 x 133 x 16 |
| 72/90 | 10K | Vapor/Liquid | 125 – 270 | 9 | 4/5 | 350 x 133 x 16 |
| 160/200 | 24K | Vapor/Liquid | 125 – 270 | 40 | 4/5 | 350 x 133 x 16 |
| 176/220 | 24K | Vapor/Liquid | 125 – 270 | 22 | 4/5 | 350 x 133 x 16 |
| 12 | 3K | Vapor | 500 – 600 | 1 | 2 | 355 x 157 x 38 |
| 18 | 3K | Liquid | 500 – 600 | 1 | 3 | 355 x 157 x 38 |
| 39/52 | 10K | Vapor/Liquid | 500 – 600 | 13 | 3/4 | 355 x 157 x 38 |
| 42/56 | 10K | Vapor/Liquid | 500 – 600 | 7 | 3/4 | 355 x 157 x 38 |
| 90/120 | 24K | Vapor/Liquid | 500 – 600 | 30 | 3/4 | 355 x 157 x 38 |
| 96/128 | 24K | Vapor/Liquid | 500 – 600 | 16 | 3/4 | 355 x 157 x 38 |
| 1050/1260 | LS 750 | Vapor/Liquid | – | 6 | 4/5 | holds 42 vials |

❶ DF is a trade name of Hemofreeze™ of NPBI, NL. Cryocyte is a trade name of Nexell International.

❷ For storage in the gaseous phase, the bottom shelf remains empty and the liquid nitrogen must not be higher than the top of the bottom compartment.

❸ The numbers identify the vessel type with which the bags can be used (3K, 10K, etc.).
Important: These are recommendations only where bags can be used with. Please observe the instructions of the bag manufacturer, especially with respect to material specification and thickness. The storage systems are designed so that individual drawers can be transferred from the liquid phase to the gaseous phase. Intermediate storage is possible in some containers in the vertical position and under the lid of the vessel.

# Liquid Cylinders for Storage and Transportation

Three vessels from the wide range of XL liquid cylinders

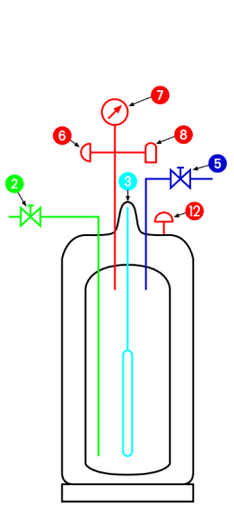

Storage and transport cylinders for liquefied gases represent important components of the Taylor-Wharton Cryo-Science Technology. The inner and outer vessels are made of stainless steel, and all vessels comply with the European Directive 1999/36/EC for transportable pressure equipment (TPED).

### Series XL 70 to XL 240

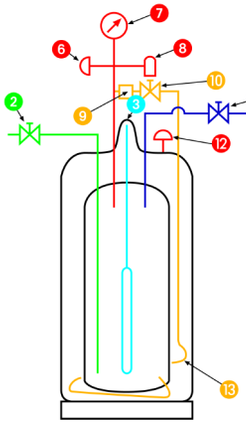
These cylinders are transportable units built to rugged construction standards. They are designed for the low-pressure requirements of liquid nitrogen filling, storing and dispensing and feature easy, quick liquid withdrawal.

### Series XL 45 to XL 65

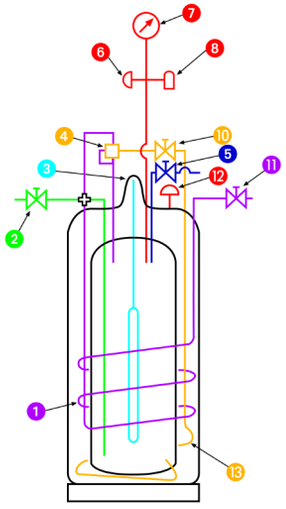
These road-transportable cylinders feature automatic pressure-building and economizer circuits. Low-loss holding capabilities help conserve gas during low demand periods. These units set the standard for liquid cylinder performance in the gas industry.



**XL 120 CE**
**XL 160 CE**
**XL 180/20 CE**
**XL 180/26 CE**
**XL 240 CE**
without pressure-building system



**XL 70 PB CE**
**XL 120 PB CE**
**XL 180/26 PB CE**
**XL 240 PB CE**
with pressure-building (PB) system



**XL 45 CE**
**XL 45 HP CE**
**XL 50 CE**
**XL 55 HP CE**
**XL 65 HP CE**
with pressure-building and economizer system

- **Safety**
- **Venting**
- **Liquid withdrawal**
- **Liquid level**
- **Vaporizer and gas withdrawal**
- **Pressure building**

1. Vaporizer
2. Fill and withdrawal valve
3. Liquid level gauge
4. Dual regulator
5. Vent valve
6. Inner bursting disc
7. Pressure gauge
8. Pressure relief valve
9. PB regulator
10. Pressure building valve
11. Gas withdrawal (use) valve
12. Outer bursting disc
13. Pressure building coil

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Storage and Transport Cylinders

## Specifications

| Models | XL 70 PB CE | XL 120 CE | XL 120 PB CE | XL 160 CE | XL 180/ 20 CE | XL 180/ 26 CE | XL 180/26 PB CE | XL 240 CE | XL 240 PB CE |
|---|---|---|---|---|---|---|---|---|---|
| Gross capacity l | 70 | 126 | 126 | 163 | 186 | 189 | 189 | 250 | 250 |
| Net capacity l | 67 | 120 | 120 | 160 | 180 | 181 | 181 | 240 | 240 |
| Max. working pressure bar | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 | 1,5 |
| Evaporation rate[1] $N_2$/%/Day | 3,5 | 2,3 | 2,4 | 1,5 | 1,3 | 1,3 | 1,3 | 1,4 | 1,4 |
| Liquid withdrawal rate l/min | 6 | 6 | 6 | 6 | 6 | 15 | 15 | 20 | 20 |
| Weight, empty kg | 71 | 82 | 82 | 104 | 115 | 116 | 116 | 137 | 137 |
| Weight, full $N_2$ kg | 125 | 179 | 179 | 234 | 260 | 263 | 263 | 332 | 332 |
| Height mm | 1115 | 1350 | 1350 | 1464 | 1635 | 1280 | 1280 | 1510 | 1510 |
| Diameter mm | 508 | 508 | 508 | 508 | 508 | 660 | 660 | 660 | 660 |
| Casters[2] | 4 | 4 | 4 | – | – | 5 | 5 | 5 | 5 |
| Auto. pressure building | yes | no | yes | no | no | no | yes | no | yes |
| Part. No. | L070-0C03 TPED | L120-0C01 TPED | L120-0C03 TPED | L160-0C00 TPED | L180-0C00 TPED | L186-0C01 TPED | L186-0C03 TPED | L240-0C01 TPED | L240-0C03 TPED |

## Specifications

| Models | XL 45 CE | XL 45 HP CE | XL 50 CE | XL 55 HP CE | XL 65 HP CE |
|---|---|---|---|---|---|
| Gross capacity l | 180 | 176 | 188 | 208 | 247 |
| Net capacity l | 169 | 165 | 176 | 198 | 240 |
| Max. working pressure bar | 15,9 | 24 | 15,9 | 24 | 24 |
| Evaporation rate[1] $O_2$/%/Day | 1,2 | 1,4 | 1,1 | 1,2 | 1,5 |
| Gas withdrawal rate $N_2$/$m^3$/h | 9,2 | 9,2 | 9,2 | 9,2 | 9,2 |
| Weight, empty kg | 133 | 151 | 139 | 164 | 201 |
| Weight, full $N_2$ kg | 269 | 284 | 281 | 324 | 395 |
| Height mm | 1562 | 1559 | 1614 | 1764 | 1476 |
| Diameter mm | 508 | 508 | 508 | 508 | 660 |
| Casters[2] | – | – | – | – | 5 |
| Part. No. | GL45-0C12 TPED | HP45-0C12 TPED | GL50-0C12 TPED | HP55-0C12 TPED | HP65-0C12 TPED |

[1] Vented NER, based on useable liquid capacity

[2] Non-magnetic casters for MRT applications available upon request

We can also deliver larger storage tanks for the supply of nitrogen to a multiple installation

## Accessories (see also p. 26)

| | |
|---|---|
| Trolley | for XL 160, XL 180 XL 45, XL 50, XL 55 |
| Withdrawal hose 1,2 m ($N_2$) | 1700-9C65W |
| Withdrawal hose 1,8 m ($N_2$) | 1600-9C66W |
| Phase separator | 1193-8C80 |
| Electronic level gauge | Information available upon request |


**Trolley**

This special trolley makes it easy to pick up and transport cylinders.

# XT Extended Time Refrigerators


XT Series refrigerators are cryogenic vessels designed for long-term storage of a variety of materials at cryogenic temperatures. XT vessels permit holding times of up to 340 days. These extremely long holding times ensure economic operation.

Typical users include research institutes and laboratories as well as pharmaceutical firms and artificial insemination centers.

XT vessels are used primarily to store straws but are also used to store vials when long holding times are important.

This series also offers a low profile model (XTL) for use in more confined workspaces.

Also available with approval acc. to Medical Devices Directive MDD 93/42EC.



## Specifications

| Models | XTL 3 | XTL 8 | XT 10 | XT 20 | XT 34 |
|---|---|---|---|---|---|
| Static holding time [1] Days | 27 | 80 | 100 | 230 | 340 |
| Working time [2] Days | 17 | 50 | 62 | 140 | 212 |
| Evaporation rate [1] l/24 h | 0,11 | 0,10 | 0,10 | 0,09 | 0,10 |
| $LN_2$ capacity [3] l | 3 | 8 | 10 | 20,7 | 34 |
| Weight, empty kg | 3,3 | 8,9 | 7,5 | 11,8 | 15,8 |
| Weight, full [3] kg | 5,7 | 15,4 | 15,6 | 28,6 | 43,3 |
| Neck diameter mm | 51 | 51 | 51 | 51 | 51 |
| Overall height mm | 437 | 483 | 597 | 655 | 668 |
| Overall diameter mm | 193 | 396 | 290 | 396 | 478 |
| Number of canisters | 6 | 6 | 6 | 6 | 6 |
| Canister dimensions [4] mm | 38x127 | 38x127 | 38x279 | 38x279 | 38x279 |
| Number of 1.2 and 2.0ml vials (5 per cane) | – | – | 150 | 150 | 150 |
| Number of 1.2 and 2.0ml vials (6 per cane) | – | – | 180 | 180 | 180 |
| Number of 0.5ml straws (10 per cane) | – | – | 540 | 540 | 540 |
| Number of 0.5ml straws (bulk, 1 layer) | 750 | 750 | 750 | 750 | 750 |
| Number of 0.5ml straws (bulk, 2 layers) | – | – | 1.500 | 1.500 | 1.500 |

[1] Evaporation rate and holding time are nominal. Actual rate may be affected by the nature of the contents, atmospheric conditions, container history and manufacturing tolerances

[2] Working time is an arbitrary, reference-only value to estimate container performance under the actual operating conditions

[3] Without canisters

[4] Canister also available in 127mm height for XT10, XT20 and XT34 models

## Accessories (see also p. 26)

| | | | | | |
|---|---|---|---|---|---|
| Roller base | – | R018-8C00 | – | R018-8C00 | R033-8C00 |
| Low liquid level alarm | – | – | – | R033-8C15 | R033-8C15 |

The roller base increases the overall height of the vessel by 110mm

# HC High-Capacity Refrigerators


HC Series refrigerators are designed to provide greater storage capacity in vessels with approximately the same dimensions as those of the XT Series.

HC Series refrigerators are used for essentially the same applications as those of the XT Series. The choice between the two series depends on the specific requirements of the user.

HC vessels are used primarily to store material in vials or for applications that involve larger quantities of straws.

The HCL vessel is especially compact, which makes it ideal wherever space is limited.

Also available with approval acc. to Medical Devices Directive MDD 93/42EC.



## Specifications

| Models | HCL 12 | HC 20 | HC 34 | HC 35 | VHC 35 |
|---|---|---|---|---|---|
| Static holding time [1] Days | 60 | 87 | 200 | 130 | 130 |
| Working time [2] Days | 37 | 54 | 125 | 81 | 81 |
| Evaporation rate [1] l/24 h | 0,20 | 0,23 | 0,17 | 0,27 | 0,27 |
| $LN_2$ capacity [3] l | 12 | 20 | 34 | 35 | 35 |
| Weight, empty kg | 9,8 | 12 | 16,1 | 17,7 | 17,2 |
| Weight, full [3] kg | 19,5 | 28,2 | 43,6 | 46,0 | 45,5 |
| Neck diameter mm | 91 | 91 | 91 | 119 | 119 |
| Overall height mm | 482 | 615 | 668 | 681 | 681 |
| Overall diameter mm | 396 | 396 | 478 | 478 | 478 |
| Number of canisters | 6 | 6 | 6 | 10 | 6 [4] |
| Canister dimensions mm | 70x127 | 70x279 | 70x279 | 67x279 [5] | 94x279 |
| Number of 1.2 and 2.0ml vials (5 per cane) | – | 570 | 570 | 850 | 1.050 |
| Number of 1.2 and 2.0ml vials (6 per cane) | – | 684 | 684 | 1.020 | 1.260 |
| Number of 0.5ml straws (10 per cane) | – | 1.850 | 1.850 | 2.800 | 3.000 |
| Number of 0.5ml straws (bulk, 1 layer) | 2.940 | 2.940 | 2.940 | 4.900 | 4.950 |
| Number of 0.5ml straws (bulk, 2 layers) | – | 5.880 | 5.880 | 9.800 | 9.900 |

[1] Evaporation rate and holding time are nominal. Actual rate may be affected by the nature of the contents, atmospheric conditions, container history and manufacturing tolerances

[2] Working time is an arbitrary, reference-only value to estimate container performance under the actual operating conditions

[3] Without canisters

[4] Optional a seventh canister is available for VHC 35 to increase storage capacity by 19%

[5] Canisters 70x279mm available on request

## Accessories (see also p. 26)

| | | | | | |
|---|---|---|---|---|---|
| Roller base | R018-8C00 | R018-8C00 | R033-8C00 | R033-8C00 | R033-8C00 |
| Low liquid level alarm | – | R034-8C15 | R034-8C15 | R037-8C15 | R036-8C30 |

The roller base increases the overall height of the vessel by 110mm

# LD Liquid Nitrogen Dewars

LD Series

***»For the storage and distribution of small quantities of liquid nitrogen«***


LD Series dewars are used to store and distribute small amounts of liquid nitrogen. They are ideal for various applications that call for the use of this medium, for example, in the area of materials testing. This series includes models with capacities ranging from 4 to 50 liters. A pitcher-style model (LD4) is available for easy pouring, as well as a beaker style model (LD5) with a wide mouth to make it easier to immerse objects in the liquid nitrogen. LD Series dewars feature extremely low evaporation rates and are convenient to use. Optional equipment includes – liquid withdrawal device, tipping stands, dippers and roller base.The „Classic 25“ is a model that has been found to be extremely practical. Because of its spherical shape and low center of gravity, it is easy to handle and is ideal for pouring liquid nitrogen.

## Specifications

| Models | LD 4 | LD 5 | LD 10 | LD 25 | Classic 25 | LD 35 | LD 50 |
|---|---|---|---|---|---|---|---|
| Static holding time [1] Days | 10 | 6 | 45 | 109 | 119 | 152 | 122 |
| Evaporation rate [1] l/24 h | 0,40 | 0,77 | 0,22 | 0,23 | 0,21 | 0,23 | 0,41 |
| $LN_2$ capacity l | 4 | 5 | 10 | 25 | 25 | 35 | 50 |
| Weight, empty kg | 3,0 | 3,1 | 6,6 | 10,5 | 8,6 | 16,0 | 17,6 |
| Weight, full kg | 6,2 | 7,2 | 14,7 | 30,8 | 28,9 | 44,3 | 58,0 |
| Neck diameter mm | 30 | 142 | 51 | 64 | 51 | 64 | 64 |
| Overall height mm | 432 | 445 | 597 | 655 | 582 | 668 | 823 |
| Overall diameter mm | 193 | 193 | 290 | 396 | 394 | 475 | 475 |

[1] Evaporation rate and holding time are nominal. Actual rate may be affected by the nature of the contents, atmospheric conditions, container history and manufacturing tolerances

## Accessories (see also pp. 26/27)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Roller base | – | – | – | R018-8C00 | D024-8C02 | R033-8C00 | R033-8C00 |
| Tipping stand | – | – | – | D025-8C00 | D025-8C00 | upon request | upon request |
| Withdrawal device with phase separator | – | – | – | D250-8C05 | – | D250-8C05 | D250-8C05 |
| Withdrawal hose 1.2m | – | – | – | 1700-9C65W | – | 1700-9C65W | 1700-9C65W |
| Withdrawal hose 1.8m | – | – | – | 1600-9C66W | – | 1600-9C66W | 1600-9C66W |
| LD hand truck | – | – | upon request | upon request | upon request | upon request | upon request |

# CXR Shippers



With the new CXR series Taylor-Wharton offers a design to overcome the problems of cleaning the dry shippers.

- Replaceable absorbent
- Cleanable
- Larger necktube diameter
- More robust
- Meets IATA requirements
- Also available with approval acc. to Medical Device Directive MDD 93/42 EC

## Specifications

| Models | | CXR 100 | CXR 500 |
|---|---|---|---|
| Static holding time [1] | Days | 16 | 11 |
| Working time [2] | Days | 11 | 7 |
| Evaporation rate [1] | l/24 h | 0,23 | 0,6 |
| $LN_2$ capacity/absorbed | l | 3,7 | 7,7 |
| Weight, empty | kg | 5,3 | 13,6 |
| Weight, full [3] | kg | 8,3 | 19,8 |
| Neck diameter | mm | 91 | 216 |
| Overall height | mm | 493 | 683 |
| Overall diameter | mm | 234 | 391 |
| Number of canisters/ Canister dimensions [4] | mm | 1/67x279 | – |
| Number of 1.2 and 2.0 ml vials (5 per cane) [4]/(6 per cane) [4] | | 85/102 | 500 |
| Number of 0.25 ml straws (bulk, 2 layer) | | 1.820 | – |
| Number of 0.5 ml straws (10 per cane) | | 280 | – |
| Number of 0.5 ml straws | | 490 | – |

[1] Evaporation rate and holding time are nominal. Actual rate may be affected by the nature of the contents, atmospheric conditions, container history and manufacturing tolerances
[2] Working time is an arbitrary, reference-only value to estimate container performance under the actual operating conditions
[3] Without canisters or racks
[4] CXR 500: cryogenic vials are stored in 100 cell boxes

## Accessories

| | | | |
|---|---|---|---|
| Shipping case<br>Dimensions WxDxH/weight | mm/kg | CX10-8C00<br>400x400x620/8,8 | CX50-8C00<br>480x480x760/14,0 |
| Padded carton<br>Dimensions WxDxH/weight | mm/kg | 3701-9277<br>370x370x710/3,25 | – |
| Rack for 9 cryogenic blood bags | | – | CP70-9C44 |
| Rack for 5 cryogenic vial boxes | | – | RS30-9C44 |
| Cryo-Box 100 | | – | 5026-1010 |
| Data logger | | M382CE | M385CE |
| PC cable with software [1] | | M381CE | M381CE |

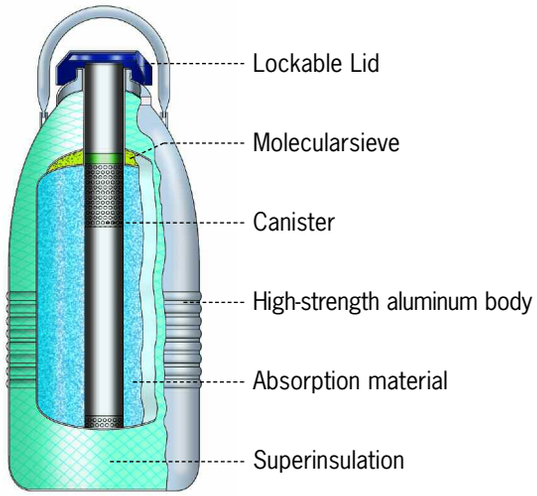
# CX Shippers


Padded carton | CX100 | Shipping case for CX100 | CX500 | Shipping case for CX500

Cryo Express „dry shippers“ are designed to transport a variety of materials at cryogenic temperatures safely. The unique absorbent material prevents a liquid spill if the unit is tipped over. This eliminates the danger of spills and represents a significant improvement in the shipment of biogenic material.

Storage temperature inside the shipping cavity remains at approximately -150° C until the liquid nitrogen evaporates from the absorbent. This increases reliability, especially in the case of shipments involving long distances.

Due to the superior vacuum performance with super insulation these units provide maximum holding times. With these vessels and the shipping cases international shipment no longer represents a problem. The vessels comply with IATA regulations.




The optional available data logger records the storage temperature of biological material.

Also available with approval acc. to Medical Devices Directive MDD 93/42EC.

CST Cryo-Science Technologies

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## Specifications

| Models | | CX100 | CX500 |
|---|---|---|---|
| Static holding time [1] | Days | 24 | 11 |
| Working time [2] | Days | 17 | 7 |
| Evaporation rate [1] | l/24 h | 0,18 | 0,6 |
| $LN_2$ capacity/absorbed | l | 4,4 | 6,4 |
| Weight, empty | kg | 5,3 | 13,6 |
| Weight, full [3] | kg | 8,9 | 18,8 |
| Neck diameter | mm | 71 | 216 |
| Overall height | mm | 467 | 683 |
| Overall diameter | mm | 234 | 391 |
| Number of canisters/ Canister dimensions [4] | mm | 1/67x279 | – |
| Number of 1.2 and 2.0ml vials (5 per cane) [4]/(6 per cane) [4] | | 85/102 | 500 |
| Number of 0.25ml straws (bulk, 2 layer) | | 1.820 | – |
| Number of 0.5ml straws (10 per cane) | | 280 | – |
| Number of 0.5 ml straws | | 490 | – |

[1] Evaporation rate and holding time are nominal. Actual rate may be affected by the nature of the contents, atmospheric conditions, container history and manufacturing tolerances

[2] Working time is an arbitrary, reference-only value to estimate container performance under the actual operating conditions

[3] Without canisters or racks

[4] CX500: cryogenic vials are stored in 100 cell boxes

## Accessories

| | | | |
|---|---|---|---|
| Shipping case Dimensions WxDxH/weight | mm/kg | CX10-8C00 400x400x620/8,8 | CX50-8C00 480x480x760/14,0 |
| Padded carton Dimensions WxDxH/weight | mm/kg | 3701-9277 370x370x710/3,25 | – |
| Rack for 9 cryogenic blood bags | | – | CP70-9C44 |
| Rack for 5 cryogenic vial boxes | | – | RS30-9C44 |
| Cryo-Box 100 | | – | 5026-1010 |
| Data logger | | M380CE | M385CE |
| PC cable with software [1] | | M381CE | M381CE |

[1] Required for programming and downloading data


**Data Logger**

The data logger permits uninterrupted monitoring and logging of the temperature inside the CX and CXR shippers. This is indispensable in the case of valuable samples. The logger and thermocouple temperature sensor are contained within a modified neck plug therefore avoiding trailing wires or extra boxes which could become damaged or detached in transit.

The logger complies with the following standards:

- EMC Directive 89/336/EEC
- RTCA DO-160D Sect. 21.4, Radiated Emission – Cat. B (for safe operation on board aircraft)

Functions/Features:

- Measuring range: -199°C to +40°C (accuracy +/- 3°C)
- Logging of up to 8192 temperature measurements in non-volatile memory
- Logging intervals can be set between 1 and 30 minutes
- Battery life of min. 5 years (non-rechargeable lithium battery)
- PC interface for setting up, collection and analysis of data
- LED status indication for recording (active/standby) and battery condition
- LED indication of too high temperature

Option:

- 'Tip Over' Switch – Detects if the shipper has been laid on its side during transport. The position is logged at the same time as the temperature. 'Tip Over' is indicated in the temperature log and by LED.

# LS Laboratory Systems


Roller base as option available

The LS Series refrigerators are uniquely designed for large vial capacity in convenient box-type storage racks and at the same time keep $N_2$ consumption to a minimum.

This results in low operating costs and fewer refills. The rectangular shape of the racks for 5x5 or 10x10 cryoboxes makes it easier to maintain an overview of and identify stored samples. As a result, samples can be located and removed more easily and faster.

The four vessels cover a range from 750 to 6,000 2ml vials. The compact LS750 can be used with either racks or with canisters.

The LS3000, LS4800 and LS6000 models can be equipped with automatic level control (see pp. 8 and 9) and they can be supplied with CE mark in compliance with the Medical Devices Directive (MDD 93/42EC).

These models can also be used for storage in either the vapor or liquid phase. In case of storage in the vapor phase, the two bottom shelves must be left empty, which reduces the capacity (see table on p. 25). The use of level controller is recommended.

Easy to operate swivel style locking rod system

Cryo-Science Technologies

LS

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## Specifications

| Models | | LS 750 | LS 3000 | LS 4800 | LS 6000 |
|---|---|---|---|---|---|
| Static holding time [1] | Days | 130 | 106 | 162 | 194 |
| Working time [2] | Days | 80 | 66 | 102 | 120 |
| Evaporation rate [1] | l/24 h | 0,27 | 0,76 | 0,80 | 0,84 |
| $LN_2$ capacity [3] | l | 35 | 81 | 130 | 165 |
| Weight, empty | kg | 17,7 | 31,8 | 40,9 | 55,0 |
| Weight, full [3] | kg | 46,0 | 97,4 | 146,1 | 186,4 |
| Neck diameter | mm | 119 | 216 | 216 | 216 |
| Overall height | mm | 681 | 731 | 892 | 991 |
| Overall diameter | mm | 478 | 683 | 683 | 683 |
| Number of 2ml vials | | 750 | 3.000 | 4.800 | 6.000 |
| Cryobox dimensions | mm | 76 x 76 | 132 x132 | 132 x 132 | 132 x 132 |
| Number of vials per cryobox | | 25 | 100 | 100 | 100 |
| Capacity for vapor phase storage | | – | 1.800 | 3.600 | 4.800 |

[1] Evaporation rate and holding time are nominal. Actual rate may be affected by the nature of the contents, atmospheric conditions, container history and manufacturing tolerances

[2] Working time is an arbitrary, reference-only value to estimate container performance under the actual operating conditions

[3] Without canisters or racks

## Accessories (see pp. 8/9 + 26)

| | | | | |
|---|---|---|---|---|
| Roller base | R033-8C00 | R05K-8C00 | R05K-8C00 | R05K-8C00 |
| Low liquid level alarm | R036-8C30 | RS30K-8C40 | R05K-8C26 | RS60-8C40 |
| CryoCon AF-1D auto. level controller | – | M255K-LS | M255K-LS | M255K-LS |
| CryoCon AFT-3L auto. level controller | – | M505K BOX-LS | M505K BOX-LS | M505K BOX-LS |

The roller base increases the overall height of the vessel by 110 mm
Installation of a level controller adds an extra 200 mm to the overall height

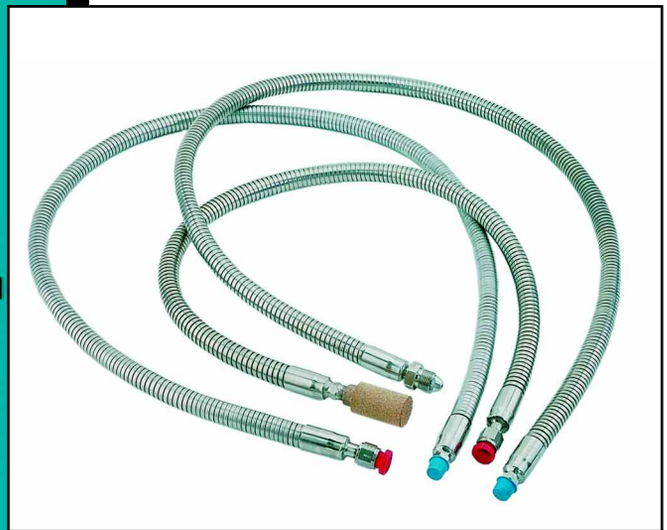
# Accessories

## Roller base

This sturdy, cast-aluminum, five wheel dolly enables you to move refrigerators and dewars easily and safely. The plastic coated surface protects the vessel. Available in 3 sizes with diameters of 396, 478 and 683 mm.

## Low level alarm

To protect valuable products, this audio/visual alarm with remote capability will sound promptly to alert you when more nitrogen is needed. It is best suited for infrequently used refrigerators and it is recommended for stored product protection. For use with XT, HC and LS vessels. Visual and acoustic alarms protect valuable material.



## Withdrawal hoses

High-strength stainless steel withdrawal hoses with additional protective sheath for the transfer of liquid nitrogen. Available in various lengths and with or without phase separator.

## Protective cryogenic clothing

Your Taylor-Wharton dealer offers a wide range of safety accessories such as gloves, aprons and goggles.

CST Cryo-Science Technologies


## Withdrawal device

For convenient and safe withdrawal of small quantities of liquid nitrogen from the LD 25, LD 35 and LD 50 dewars. Up to 8l/min can be withdrawn at max. 0.5 bar. The vessel can also be filled without removing the withdrawal device. Hoses available.


## Tipping stand

Stable design with five casters permits convenient pouring from the LD 25 dewar (with padded vessel clamp) and the Classic 25 by simply tipping the stand.

## Tipping stand for LD 35

Special stand for the LD 35 with four casters (brakes on two casters) to permit safe, easy tipping.

## LD Hand truck

This all-purpose hand truck permits safe transport of dewars with a capacity of up to 50 l. Tubular steel construction and balloon tires make this hand truck extremely rugged and easy to maneuver. Can be used with a range of dewars.

5/2005, Our policy of continuing product improvement may cause changes in the specifications

Taylor-Wharton

Harsco

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